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ABSTRACT

The purpose of this study was to determine the feasibility of the cloze procedure as an additional means of speeding up the process of determining a child's mathematical reading abilities. Two cloze mathematical reading tests (CMRT) of equal length were constructed. The tests averaged 250 words each and every fifth word was deleted. One cloze passage was taken from a sixth grade mathematics text and the other passage was an excerpt from a seventh grade mathematics test. A total of 120 sixth grade students took the sixth grade CMRT. Of these students, 61 also took the seventh grade level CMRT. Only the exact answers corresponding with the deleted words were credited as correct responses. The results indicated that most of the students tested by the sixth grade level CMRT were at the instructional and independent reading levels, approximately all of the students who took the seventh CMRT were at the frustration and instructional reading levels, and a statistically significant correlation was found between the CMRT and the IQ scores of the students sampled. (WR)

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An Exploration of the Cloze Procedure in Arithmetic Reading

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The Problem

To what extent does the Cloze procedure of test construction and evaluation aid the teacher in grouping a heterogenously arranged class by mathematical reading abilities?

While enrolled in a reading course, the thought occured to the writer that perhaps a Cloze test would be of value to a sixth grade mathematics teacher. One might take advantage of the Cloze technique as an additional means of speeding up the process of determining a child's mathematical reading abilities. This data could then be used at the beginning of a school year, along with the information of the child's permanent files, to complement teacher observations. Thus, the problem of this investigation involving the Cloze Mathematical Reading Test (CMRT) originated. It was designed to help the classroom teacher acquire data to form classroom instructional groups.

Review of the Literature

Upon reviewing the literature, one becomes ecstatic over the possibility of using the Cloze procedure for grouping purposed in mathematics as well as in reading. In the reading area Henry Alexander (1968) investigated the Cloze procedure as a means of determining the Frustra-

tional, Instructional, and Independent reading levels of intermediate grade pupils. He concluded that the Cloze procedure was a predictable measurement to identify the three reading levels of the intermediate-aged child. He recommended the test's usage for this purpose. Bormuth (1965) and Rankin (1959) also recognized the usefulness of the Cloze technique in the reading areas.

A further survey of literature disclosed that research and application of the Cloze technique in the mathematical area has been very limited. In the last decade researchers such as Hater and Kane (1970), Grouws and Robinson (1973), and Covington (1966) have displayed applications of the Cloze test in mathematics. For example, Covington (1966) employed the Cloze technique to illustrate that the third and fourth grade Greater Cleveland Mathematics Program textbooks were not readable for the third and fourth grader's purposes. The general findings of the literature justified looking at the Cloze procedure as a means of helping teachers gain data for instructional grouping.

Procedure

After recognizing that very little work had been performed using the Cloze procedure to aid a teacher in ability grouping decisions, a pilot was initiated in a local sixth grade mathematics class, in October, 1973. Two Cloze Mathematical Reading Tests (CMRT) of equal length were constructed. They averaged 250 words each with every fifth word deleted (Bormuth, 1965). One Cloze passage was taken from the state adopted New Dimensions in Mathematics sixth grade text. Another passage was an excerpt from the state adopted seventh grade text, Modern School Mathematics. Passages were

selected at rando from stated problems in the two books. The passages proved to be on sixth and seventh grade readability levels according to Edward Fry's "Graph for Estimating Readability". Students were given sample illustrations from other passages in the textbook to acquaint them with the Cloze test answering procedure. A total of 120 sixth grade students took the sixth grade CMRT. Of the 120 students, sixty-one students took the seventh grade level CMRT. Only the exact answers corresponding with the deleted words from the text were credited as correct responses.

The Results

The resulting individual scores of sixty-one students are shown in Figure 1. The loss of one-half of the students who read the seventh grade level CMRT occurred because of a lack of information in the permanent records that were essential for a companion study. Other losses occurred because of the inability of many of the students to understand the words in the passages. For example, twenty-eight students were not listed on the graph, though they scored between 0 and 10 on both levels of the test. They were excluded due to their inability to read and comprehend the required passages.

Taking a closer look at Figure 1, we find the following observations: First, most of the students tested by the sixth grade level CMRT are on the Instructional and Independent Reading Levels. Second, virtually all of the students that took the seventh grade level CMRT are on the Frustrational and Instructional Level. Last, according to teacher observation, 63% of the students participating in the research were above average

students in all academic areas of the school curriculum.

Table I, Student Reading Levels on Two Levels of Difficulty reveals that on the sixth grade level CMRT approximately 12% of the students were on Frustrational level, 37% were on the Instructional level and 52% on the Independent reading level. The results of the seventh grade level CMRT disclosed almost 51% of the students to be on the Frustrational level, 47% on the Instructional level and only 1.6% on the Independent level. It is important to remember that over 60% of the students were above average in all areas of the curriculum.

TABLE I

"Student Reading Levels on Two Levels of Difficulty"

Bormouth's Criteria	%	N	6th gr.	N	7th gr.
Frustrational Level	<42%	9	11.6%	40	50.9%
Instructional Level	<57%	16	36.9%	13	47.5%
Independent Level	>58%	29	52.5%	1	1.6%
		N=54		N=54	

Table II, Comparison of 6th Grade Passage CMRT Scores and I.Q. Scores of Samples represents some interesting ideas. Scores from Table II indicate that the students on the Frustrational level have a CMRT mean score of 29% with an I.Q. mean score of 79; students on the Instructional level have a CMRT mean score of 55% and an I.Q. score of 95; on the Independent level the CMRT mean was 66% and the I.Q. 111. Another interesting fact presented is how highly the groups sixth grade passage mean CMRT scores correlated with the I.Q. mean scores. The Pearson correlation of the

sixth grade passage CMRT scores and I.Q. scores was .752 for example. This significantly high correlation could lead a teacher into ever deeper research based on this one area.

TABLE II

"Comparison of 6th Grade Passage CMRT Scores and I.Q. Scores of Samples"

		CMRT		I.Q.	
6th grade passage	%	M	S. D.	M	S. D.
Frustrational Level	<42%	28.67	13.96	79.00	9.31
Instructional Level	<57%	54.87	2.63	94.56	10.24
Independent Level	<58%	66.49	4.63	111.06	7.77
N=54					

Table III, Comparison of the 7th Grade Passage CMRT Scores and I.Q. Scores of Samples lists the CMRT mean score of 29% with an I.Q. mean score of 97 on the Frustrational level; on the Instructional level the CMRT mean was almost 48% while the I.Q. score was 113; only one student's score was at the Independent reading level with a CMRT score of 64% and an I.Q. score of 112. This table seems to reiterate the facts stated in Table II. Both tables illustrate a statistically significant correlation between the CMRT and the I.Q. scores.

TABLE III

"Comparison of 7th Grade Passage CMRT Scores and I.Q. Scores of Samples"

7th grade passage	CMRT M	CMRT S.D.	I.Q. M	I.Q. S.D.
Frustrational Level	28.8	12.3	97.0	14.7
Instructional Level	47.7	4.3	112.9	7.8
Independent Level	(one student-CMRT 64%; I.Q.=112)			
N=54				

Conclusions

On the basis of the results obtained it appears that the arithmetic teacher can use the Cloze test as an aid in grouping purposes. This teacher does not profess a great deal of expertise in statistical analysis. However, after one reviews the results concerning this pilot study, perhaps an interest may be aroused for an extended study of the Cloze procedure in a similar mathematical setting. Recommendations based on the findings of this study show the practicality of the Cloze technique in benefitting the teacher as well as the ability needs of the individual students. Of course, it is recommended that this be used in accordance with other achievement or diagnostic scores and teacher observations in meeting a child's needs. It appears also that the relationship between the Cloze scores and the I.Q. scores present another interesting problem for future research.

Figure 1

Cloze Mathematical Reading Test